

as pebbles or gravel;" or generally, "any large water-worn and smoothed blocks, found embedded in the clays and gravels of the drift formation." The maximum size he assigns to gravel is the size of a hen's egg, and pebbles may be ten times as large as this, so that the smallest boulder may be regarded as being of more than a foot diameter. Again, the same author describes boulders as being "often of great size, and weighing many tons."

Dr. Nuttall, in his Pronouncing Dictionary, defines boulders as being "large round pebbles;" and it would not often be possible to put even a small pebble in one's waistcoat pocket, and it must be a high wind that could blow a large pebble for any distance.

Chambers gives, as the etymology of boulder, or bowlder, as it is sometimes spelt, the verb "to bowl," and so states that it means a rolling stone, and, afterwards, one rounded by water. Now boulders are very often found separate, and at some distance from each other, and how could they have been rounded separately, without friction with each other, if they had been otherwise than large?

These arguments may be enough to show that boulders cannot be very small, and, in fact, may vary from stones 18 inches diameter, or thereabouts, to immense rocks of 10 feet diameter, "weighing many tons."

Christ's Hospital, May 27

J. W. CRAWLEY

Scandinavian Skulls

MR. G. STRACHEY, commenting in your columns on a recent lecture of Professor Huxley's, makes the following statements:—

"According to the highest Copenhagen authorities, there is no ground whatever for the assertion that modern Scandinavian skulls are of the long type. It is equally incorrect to say that Scandinavians are fair-haired and blue-eyed."

Without at all wishing to endorse Prof. Huxley's views on British ethnology, which I regard as rather bold than sound, I may be allowed to express my astonishment at the statements just quoted.

The skull measurements of Retzius, Van der Hoeven, and Barnard Davis all exhibit the Swedes as a more or less dolichocephalous people. My own measurements of the living head (Anthrop. Memoirs, ii. 351, and iii. 378) tend to controvert both Mr. Strachey's facts and Prof. Huxley's theory. Lastly, I should be glad to know where in the world fair hair and blue (or light) eyes are to be found, if not in Scandinavia. They are not universal there, nor any where else, but I do not think they are anywhere more common, except possibly in Lithuania or Esthonia.

Clifton, June 7

JOHN BEDDOE

Formation of Caverns

IN NATURE of 21st April, Mr. W. Boyd Dawkins, writing of caves in Yorkshire, tells us:—"All have been at one time or other subterranean water-courses." In the *Popular Science Review* for October 1869, the same gentleman writes:—"The ceiling, at the time of its deposition, must have been supported by a layer of cave earth." With your permission I will explain the character of a phenomenon, which I have published in my "New Pages of Natural History" (Newby, 1868), which may suggest to Mr. Dawkins the manner in which the caves at Streddle and Kent's Hole were formed. In the province of Poona, Bombay, the Ghar Nuddee (white river) has, in the mountains near its source, several lime formations spanning its level. In the dry season the river runs below as a subterranean stream; in the Monsoon it runs over this sheet of lime, which varies in thickness from a few inches to two feet along the centre or crown of the cavity, increasing in thickness towards the sides; there are several fissures on the surface; the hole at the upper end is smaller than that at the lower; the whole formation is in layers, and is due to water containing vast quantities of lime in solution. Originally there was a dip or hollow place on the spot, which gradually filled with all sorts of materials, till they grew nearly to the level of the dry season stream. In this condition the first thin sheet of lime was deposited on them, till by successive seasons the formation grew into a substantial covering composed of yearly layers. As there were perishable materials down below, they subsided, so that the lime covering, having in places no support, gave way to the force of the water, or to the weight of boulders

hurled upon it, and water found admission between the lime sheet and the buried materials; as these were more moveable than the covering, they gradually washed out, and left the river to resume its ancient course beneath a covering of its own formation. Of course subterranean streams may excavate caverns; but if these streams owe their origin to percolation only, no large organic remains will be found in the caverns. If these are formed after the fashion of the Ghara caves, some organic remains may still be found, though waters have washed through them for years. When these lime formations withstand all the forces to which they are subjected, and have grown into large hills, the materials which formed the mould of the cave are still *in situ*, the perishable portions have changed into an oily, loamy soil; but bones, pebbles, and other materials are there mixed up with the stalagmite, which originally forming upon the surface of these materials, sunk and broke up as the supports failed, and remain, as Mr. Dawkins found them in Kent's Hole.

H. P. MALET

The Anglo-Saxon Conquest

I SAW, with perfect clearness, the grounds upon which Prof. Rolleston now rests his defence. It is assumed that we can identify, to a nicety, the precise period of an interment, having no recording date, that took place fourteen or fifteen hundred years ago. I need not contest or discuss this point, but I am at liberty to doubt it.

The Britons petitioned Rome for assistance in A.D. 446. Cerdic landed in 494; the *groans of the Britons* were a piteous wail of "old men and children." The interval, taking it at three generations, passed in constant warfare, would not restore the balance of youth removed by conscription prior to A.D. 418, which circumstance therefore remains in part as an element to affect the general average of assumed longevity in the time of Cerdic. I urge this, with all respect, not as affecting, in any way, the real facts discovered or expounded by Prof. Rolleston, with whose address I was very much gratified; but only as affecting certain conclusions sought to be founded thereon. A. HALL

Curious Effect of the Words "Carmine" and "Germinal Matter"

DURING the twelve or thirteen years that Mr. Huxley has performed the duties of Examiner at the University of London, it appears that he has been much disturbed by the frequent use the candidates have made of the words, "cell," "germinal matter," and "carmine." He says: "*I declare to you I believe it will take me two years at least of absolute rest from the business of an examiner to hear either of the words without a sort of inward shudder.*"* This is surely a very remarkable declaration on the part of the examiner, since it is extremely doubtful if hearing these words ever made anyone else shudder, and if any other words written or spoken ever produced an effect so exceptional upon Mr. Huxley.

LIONEL BEALE

Holly Berries

WILL some learned botanist, or Darwinian theorist, kindly inform me through the columns of NATURE why some holly berries appear obnoxious to birds? This is a great holly neighbourhood, and there are at present several trees actually loaded with ripe berries; the ground is also thickly strewn with berries beneath the trees, and yet not a single species of bird appears to eat them. Last winter the holly trees bore an abundance of berries, but the majority of the trees were stripped by the migratory *Turd*i, &c., as early as the beginning of February. I presume, in the "struggle for existence" these berries, obnoxious to birds, will stand a better chance of propagating and increasing that peculiar variety, and in course of time raise a distinct and well marked species.

Thurxton, May 23

HENRY REEKS

Origin of Languages

It seems to me that your correspondents, Mr. Taylor and S. J., have discovered merely imaginary differences between the origin of species and the origin of languages. Mr. Taylor sees an essential difference in the fact that in the one case the process "is carried on by the countless efforts of rational beings," whilst in the other case there is "reasonless variation and selection."

* Address on Medical Education, *Lancet*, June 4th, 1870.

But I think the analogy still holds good, inasmuch as the "gradual variation, &c., of a few primary sounds," is not the result of an *intention* to originate a new language, any more than the origination of a new species of animal by natural selection is *intentional* on the part of the animals engaged in the struggle for life.

S. J.'s "impression is that the dialects which run wild are much more variable than those under man's care, which is the reverse of the case with wild and domestic animals and plants." But it must be remembered that it is the object of the "host of schoolmasters, lexicons, and grammars," who "watch over the Queen's English" to make that language uniform, to check its variations. If breeders of cattle made an effort to obtain perfect uniformity in a certain species of animal, I have no doubt that the wild herds of that animal, if allowed to exist under different conditions, would show much more variation "than those under man's care." But I question whether, in spite of the conservative influences of "schoolmasters, lexicons, and grammars" languages do not undergo as much variation through the *artificial selection* of writers, whose aim it is to make language more and more expressive, as animals and plants undergo through the artificial selection of breeders and agriculturists.

King's Lynn, May 28

ARTHUR RANSOM

STONE IMPLEMENTS FROM BURMA

SOME notes on the stone implements of Burma, by W. Theobald, jun., of the Geological Survey of India, contained in the number of the Proceedings of the Asiatic Society of Bengal for July, 1869, seem worthy of notice in these pages. "The implements are curious as differing in form and type, not only from anything found in India, but from anything hitherto described from any part of Europe, though any implement yet found in India has its precise analogue in Europe." According to Mr. Theobald, not only is the form but the material remarkable, as these Burmese implements are fashioned either of basalt or some schistose rock, quite unlike anything to be met with in the district where the implements themselves occur; a fact which he thinks points to their having been brought down from Upper Burma (where such implements are common) by the original settlers of the country.

That curious superstition which prevails over almost the whole of the globe, and connects the origin of these stone implements with the "thunderbolt," is found also in Burma. They are there called *mo-gio*, or thunderbolts, and are believed to accompany the lightning. If a flash of lightning is seen to strike the ground, and an earthen vessel is inverted over the spot, in the course of a year or so the *mo-gio* will be found in it, having worked its way back again to the surface by its own recoil.

The classical, or rather Plinian, view of this subject has been well given by Bishop Marbodæus, who wrote his Book "De Gemmis" early in the 12th century, and who thus speaks of the Ceraunius:—

Ventorum rabie cum turbidus æstuat aër,
Cum tonat horrendum, cum fulgurat igneus æther,
Nubibus elisus cælo cadit ille lapillus,
Cujus apud Græcos extat de fulmine nomen.

Its virtues were great in Europe as preserving from injury by lightning or shipwreck, and they had even aggressive as well as prophylactic powers, enabling the possessors to take beleaguered cities and to destroy hostile fleets.

In Burma they are also highly valued, but are put to crucial tests to prove them to be the genuine article, before a purchaser pins his faith to them. One test is that if wrapped in cloth and fired at with a gun, no effect will be produced either on the cloth or its contents, however near the aim may be taken, and it is from its presence producing invulnerability in its wearer that the *mo-gio* is mainly valued. It may be observed that it is not stated whether it is the seller who is entrusted to take aim with the gun. Another test of its celestial origin is placing it on a mat with a quantity of rice. If genuine, no fowl or other creature will venture near it. Again, a plainain tree

cut down with it ought to die, and not, as is usual, to send up a new shoot. If genuine, it preserves from fire, but it has also great medicinal virtues, and a small chip administered internally is considered a cure for inflammation of the liver or other internal organs, and is also a specific for ophthalmia. The virtues of stone axes in Germany, as summarised by Preusker in his "Blicke in die vaterländische Vorzeit," are curiously similar to those of the Burmese *mo-gios*. They preserve the house in which they are from lightning, they perspire when a storm is approaching, they are good for diseases of man and beast, they increase the milk of cows, they assist the birth of children, and powder scraped from them may be taken with advantage internally as a remedy for certain diseases.

The types of these Burmese instruments described by Mr. Theobald seem susceptible of arrangement under four heads.

1. "A rough, stout, wedge-shaped instrument," which, to judge from the figure, resembles closely the better finished specimens of flint hatchets, of the type which occurs in the Danish Kjökenmöddings.

This form is very rare.

2. A hatchet with flat sides converging towards the base, which is square, and with a segmental edge, much like a common German form.

This type is common.

3. A long adze, with square, slightly converging sides, and a bevelled segmental edge, in character much resembling some of the implements discovered in Java, Borneo, and Sumatra, and also a New Zealand form; and—

4. Implements of the same character so far as the edge and sides are concerned, but having the butt end reduced in width so as to produce a square shoulder on each side of the blade. In some this reduction in width extends more than half the length of the blade, so as to produce a T-shaped form. These shorter specimens are the most common. This form appears to be peculiar to Burma. One of them has been figured by the Society of Antiquaries (Proc. N.S. vol. ii. 96).

In some cases the lashings used to fasten them to their hafts have left traces on the stone. The implements are usually picked up on the surface of the hills, in the fields, or clearings made for cultivation, and not in the plains. Mr. Theobald seems inclined to doubt whether, without the use of iron also, those who made these implements could have effected clearances in the gigantic forests of Pegu; but it may be urged against this view that by calling in the aid of fire the efficiency of such tools is almost as great as if they had been formed of metal, and it is difficult to conceive a people in possession either of bronze or iron bestowing the necessary time and trouble on the fashioning of stone tools, when those of metal were at their command, which, whether fire were employed in the clearance or no, were for general purposes so much more effective. If the makers of these stone tools had been in possession of other means for clearing the hill sides, then Mr. Theobald would be inclined to regard the stone relics as agricultural implements used in hand agriculture, at the end of sticks, as a kind of spade, to form the shallow holes for the cultivation of "hill rice." If not explained in this manner, he argues, we must regard them as weapons of the chase and war, though this use is, he thinks, negated by their thoroughly inefficient character for such purposes. To this may be objected, first, that the material of which they are usually formed is basalt, a stone constantly used as a material for cutting tools; secondly, that the presence of the square shoulders, so like those on the horn sockets for hatchets of the Swiss Lake-dwellers, seems to testify to the tools having been used as adzes or axes, or possibly chisels; and thirdly, that if they had been required merely for hoeing or digging, the trouble of grinding and polishing might and would have been saved. We will only add